WFPC2 Studies of the Disk and Jet of HH 30
Contributed Presentation at IAU Colloquium 163

Hubble Space Telescope imaging of HH 30 has revealed this object to be a prototype young stellar object (YSO) accretion disk system. An optically thick circumstellar absorption disk, 400 AU in diameter, is seen extending perpendicular to highly collimated bipolar jets. HH 30 is the first YSO disk ever observed at 14 AU resolution, and the first viewed close enough to edge-on that the vertical structure of the disk is clearly visible. We have compared the images to model nebulosities calculated in both multiple and single scattering regimes, in the latter case via chi-squared minimization. This analysis constrains the circumstellar density distribution and grain scattering properties. We find that the disk is viewed 7 degrees from edge-on. The fitted scale height is 15.5 AU at a radius of 100 AU, implying a dynamical temperature of 34 K for a 0.67 Msun central star. The radial power law indices for the scale height and surface density are not strongly constrained by these data; acceptable values range from 1.2-2.0 and < -0.3 respectively. For nominal interstellar dust opacities the disk mass is a few times 10^-4 Msun, which for the expected accretion rates implies a remaining disk lifetime of just 10^4 years. The bright blueshifted jet has a FWHM less than 25 AU at the base of the reflection nebula and an opening angle of 3 degrees within 700 AU of the star. We find a typical spacing of 100 AU between knots in the jet, which combined with the measured proper motions suggests that new knots emerge from the source every few years. We will also present recently obtained OVRO Millimeter Array maps of the circumstellar gas, and discuss plans for further HST observations this coming year.